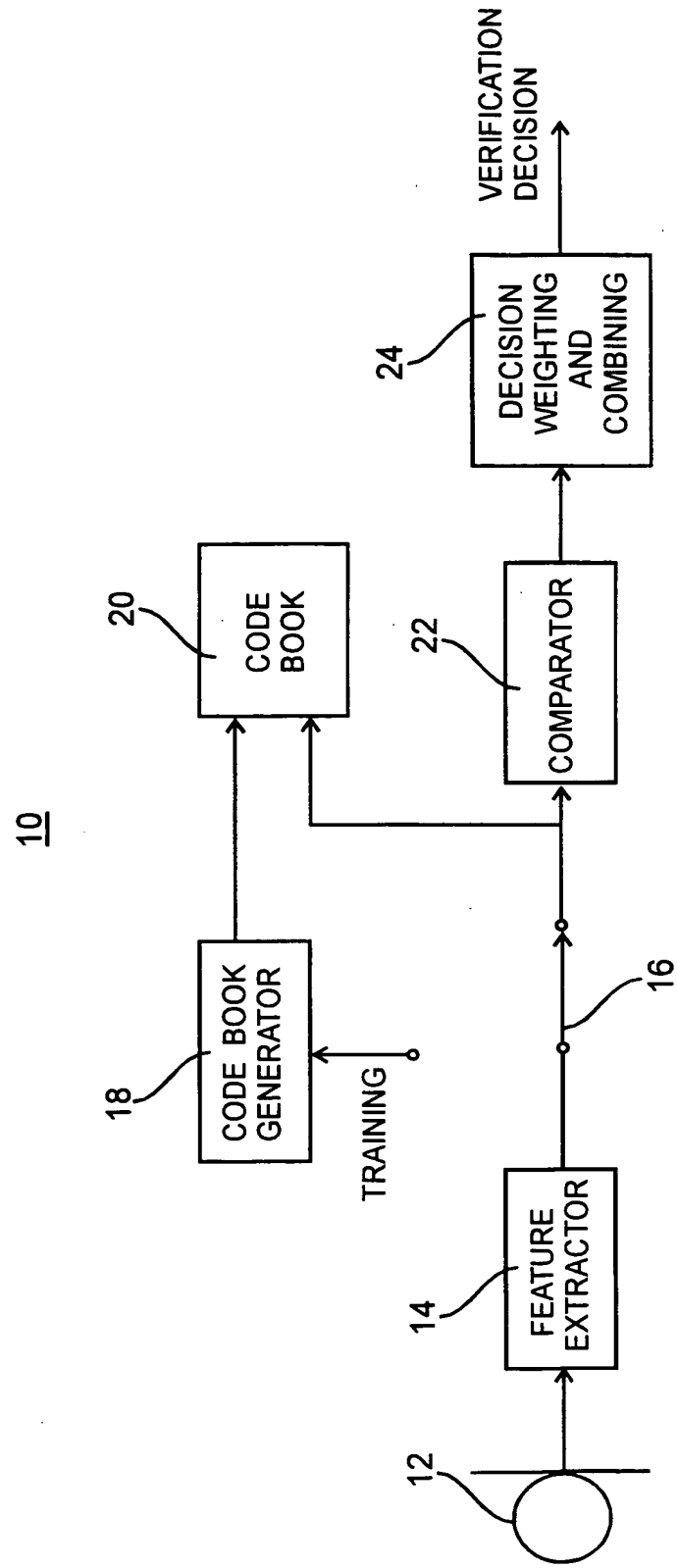
10
12
14
FEATURE EXTRACTOR
16
18
CODE BOOK GENERATOR
TRAINING
20
CODE BOOK
22
COMPARATOR
24
DECISION WEIGHTING AND COMBINING
VERIFICATION DECISION

Fig. 1

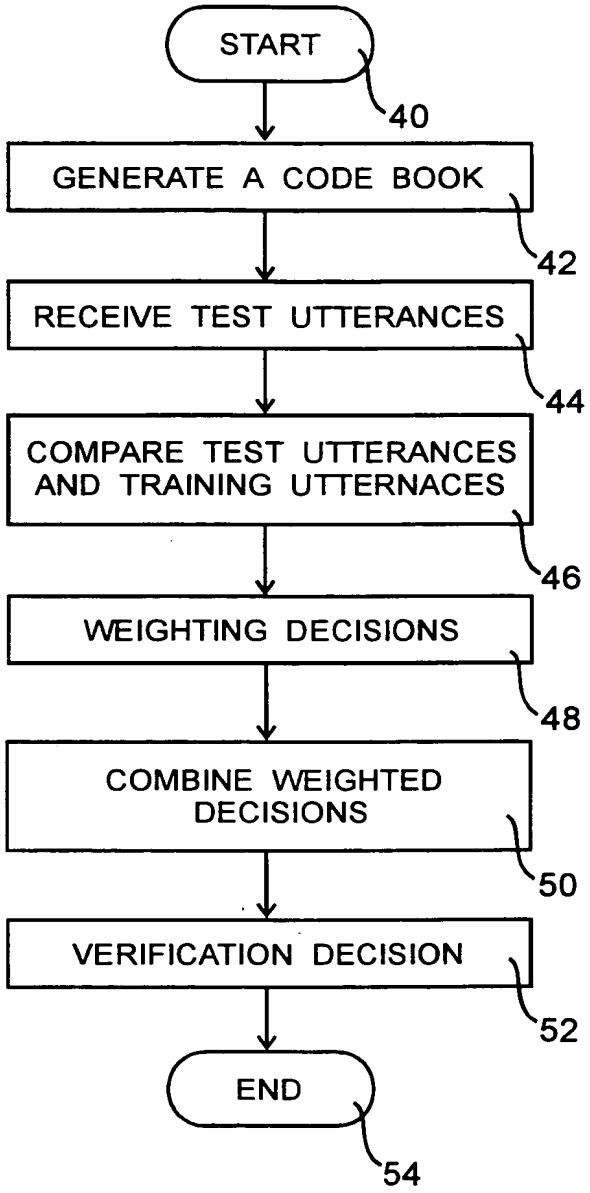
START
40
GENERATE A CODE BOOK
42
RECEIVE TEST UTTERANCES
44
COMPARE TEST UTTERANCES AND TRAINING UTTERNACES
46
WEIGHTING DECISIONS
48
COMBINE WEIGHTED DECISIONS
50
VERIFICATION DECISION
52
END
54

Fig. 2

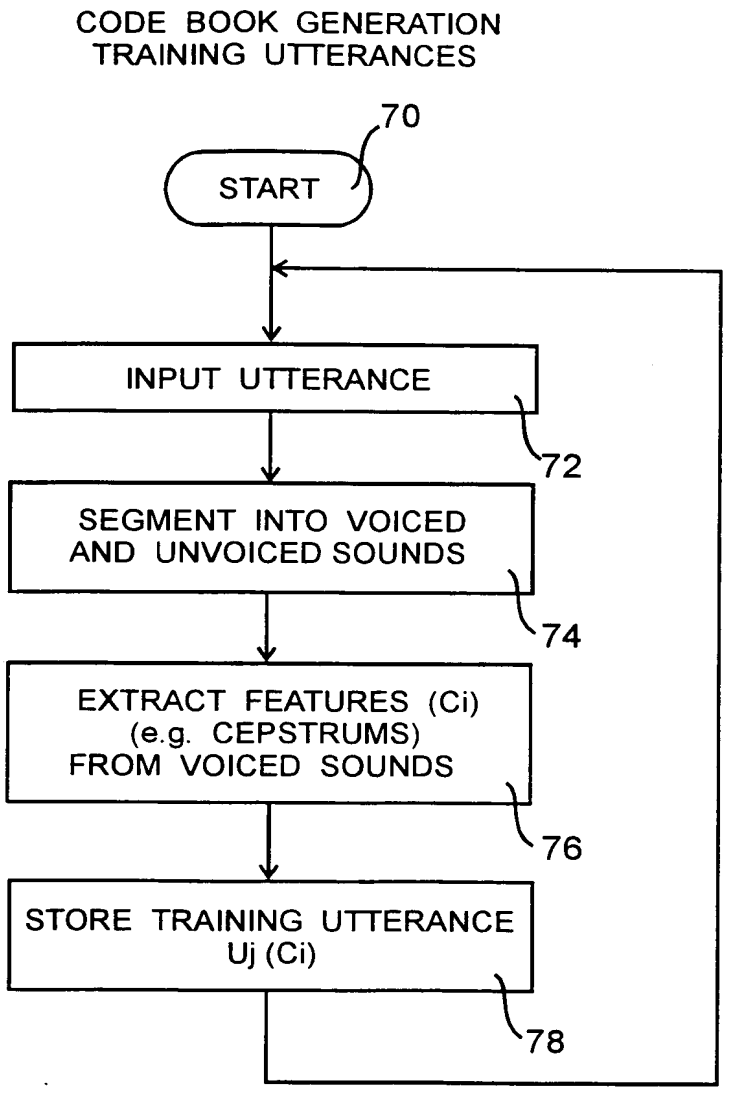
CODE BOOK GENERATION
TRAINING UTTERANCES
70
START
INPUT UTTERANCE
72
SEGMENT INTO VOICED
AND UNVOICED SOUNDS
74
EXTRACT FEATURES (Ci)
(e.g. CEPSTRUMS)
FROM VOICED SOUNDS
76
STORE TRAINING UTTERANCE
Uj (Ci)
78

Fig. 3

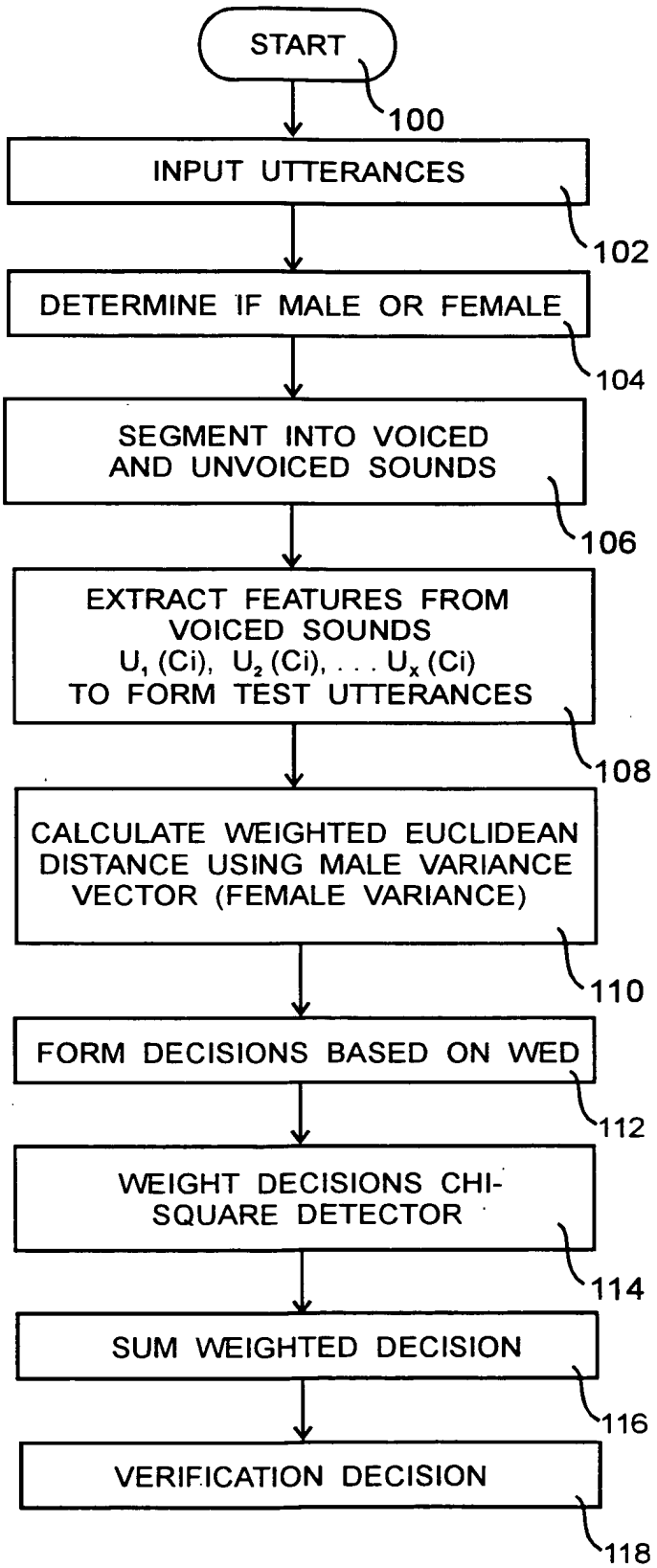
VERIFICATION DECISION
START
100
INPUT UTTERANCES
102
DETERMINE IF MALE OR FEMALE
104
SEGMENT INTO VOICED AND UNVOICED SOUNDS
106
EXTRACT FEATURES FROM VOICED SOUNDS
$U_1(Ci)$, $U_2(Ci)$, . . . $U_x(Ci)$
TO FORM TEST UTTERANCES
108
CALCULATE WEIGHTED EUCLIDEAN DISTANCE USING MALE VARIANCE VECTOR (FEMALE VARIANCE)
110
FORM DECISIONS BASED ON WED
112
WEIGHT DECISIONS CHI-SQUARE DETECTOR
114
SUM WEIGHTED DECISION
116
VERIFICATION DECISION
118

Fig. 4

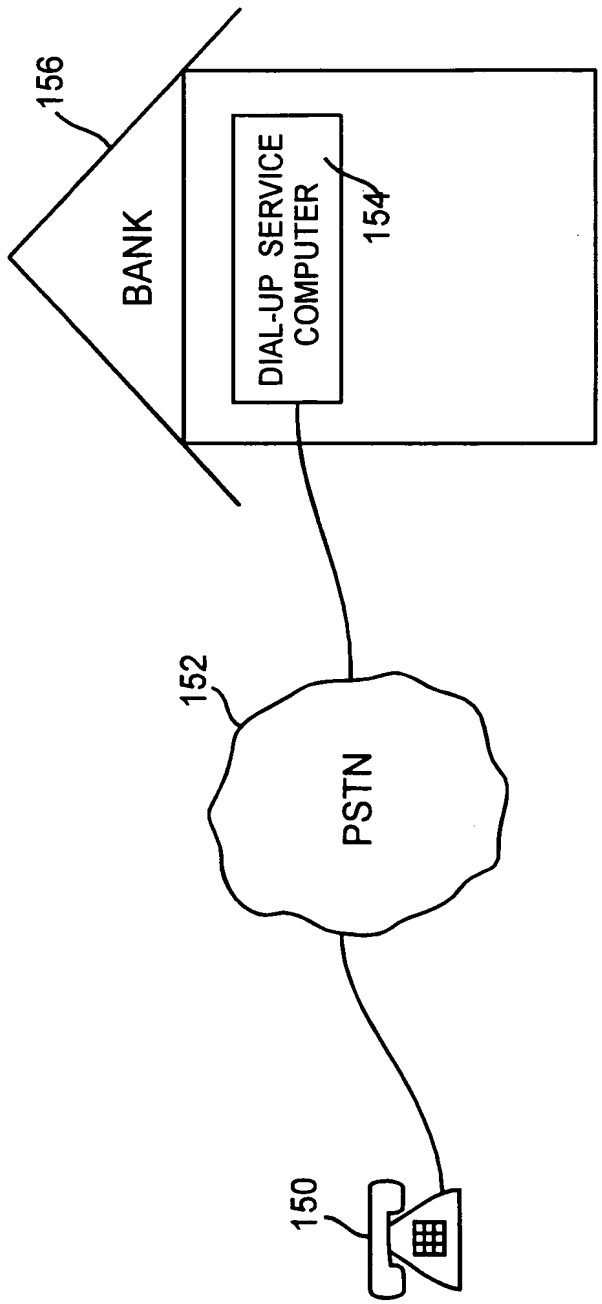

Fig. 5

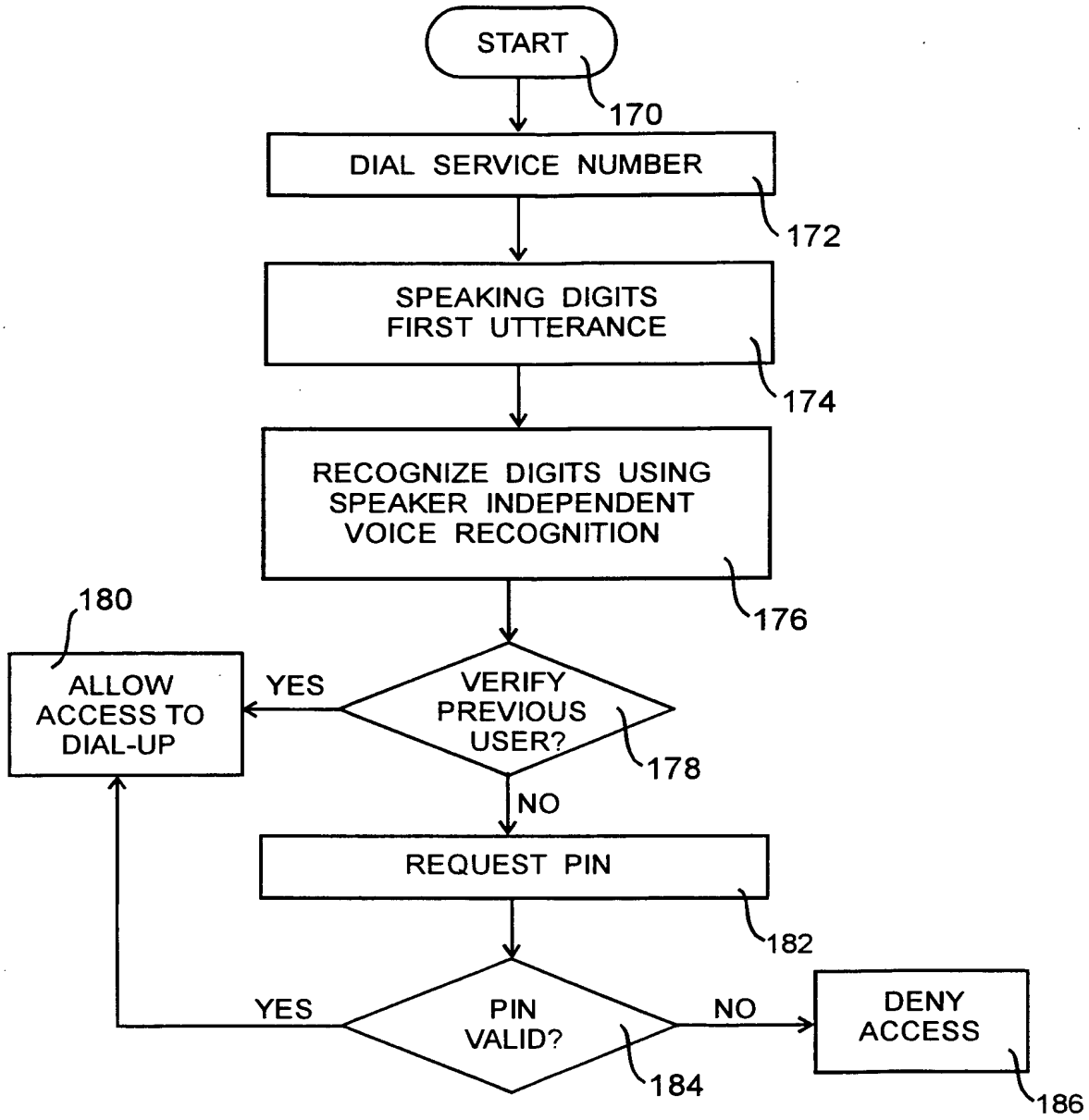
START
170
DIAL SERVICE NUMBER
172
SPEAKING DIGITS FIRST UTTERANCE
174
RECOGNIZE DIGITS USING SPEAKER INDEPENDENT VOICE RECOGNITION
176
VERIFY PREVIOUS USER?
178
YES
ALLOW ACCESS TO DIAL-UP
180
NO
REQUEST PIN
182
PIN VALID?
184
YES
NO
DENY ACCESS
186

Fig. 6

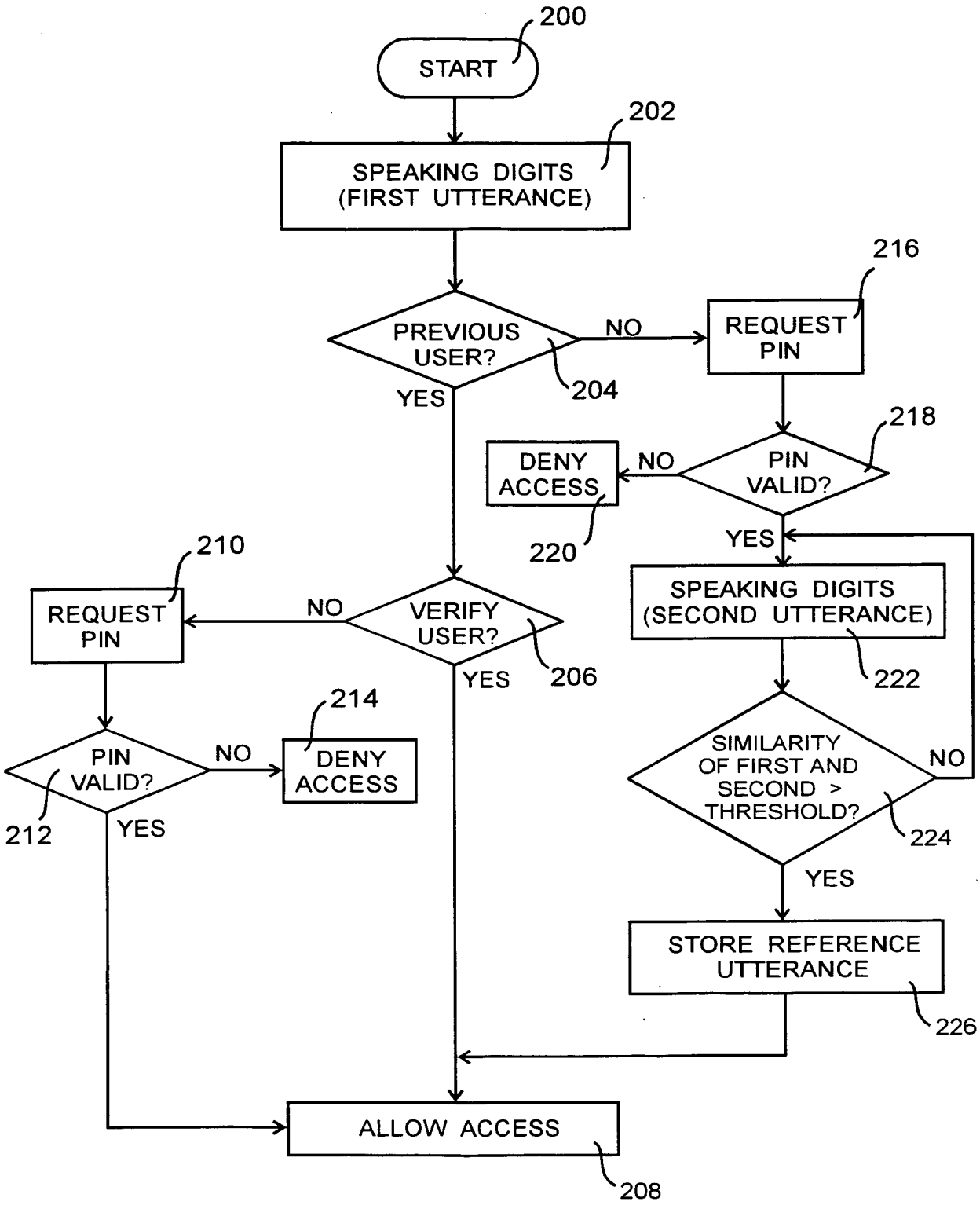
200
START
202
SPEAKING DIGITS (FIRST UTTERANCE)
PREVIOUS USER?
NO
204
YES
216
REQUEST PIN
218
PIN VALID?
NO
DENY ACCESS
220
YES
SPEAKING DIGITS (SECOND UTTERANCE)
222
SIMILARITY OF FIRST AND SECOND > THRESHOLD?
NO
224
YES
STORE REFERENCE UTTERANCE
226
VERIFY USER?
NO
206
YES
210
REQUEST PIN
214
PIN VALID?
NO
DENY ACCESS
212
YES
ALLOW ACCESS
208

Fig. 7